

**ABSTRACT OF THE DISCLOSURE**

Waveguides having air-gap cladding layers and methods of fabricating waveguides having air-gap cladding layers are disclosed. A representative waveguide includes a waveguide core having an air-gap cladding layer engaging a portion of the waveguide core. In addition, a representative method of fabricating a waveguide having an air-gap cladding layer includes: providing a substrate having a lower cladding layer disposed on the substrate; disposing a waveguide core on a portion of the lower cladding layer; disposing a sacrificial layer onto at least one portion of the lower cladding layer and the waveguide core; disposing an overcoat layer onto the 5 lower cladding layer and the sacrificial layer; and removing the sacrificial layer to define an air-gap cladding layer within the overcoat polymer layer and engaging a portion of the waveguide core.

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